Claims

1. An ultraviolet light source comprising

an ultraviolet bulb;

a microwave energy source for exciting said ultraviolet bulb; and

an enclosure for enclosing the ultraviolet bulb, the enclosure comprising an optically transparent waveguide,

wherein the dominant wavelength of the ultraviolet light source is either

(a) from 140 to 240nm and the ultraviolet light source is suitable for use in promoting molecular dissociation reactions; or

(b) from 300 to 400nm and the ultraviolet light source is suitable for use in promoting photochemical reactions.

2. An ultraviolet light source according to claim 1, wherein the dominant wavelength of the ultraviolet light source is from 160 to 200nm.

3. An ultraviolet light source according to claim 1, wherein the dominant wavelength of the ultraviolet light source is from 330 to 370nm.

4. An ultraviolet light source according to any of claims 1 to 3, wherein the ultraviolet bulb has no electrode.

5. An ultraviolet light source according to any of claims 1 to 4, wherein the waveguide controls the flow of microwave energy from the enclosure.

6. An ultraviolet light source according to claim 5, wherein the waveguide blocks a majority of the flow of microwave energy from the enclosure.

7. An ultraviolet light source according to any of claims 1 to 6, wherein the enclosure comprises quartz or a UV-transparent plastic material.

8. An ultraviolet light source according to any of claims 1 to 7, wherein the waveguide comprises a conducting material.

9. An ultraviolet light source according to claim 8, wherein the conducting material is a coating or liner to the waveguide.

10. An ultraviolet light source according to either claims 8 or 9, wherein the waveguide comprises a conducting mesh.

11. An ultraviolet light source according to claim 10, wherein the conducting mesh comprises a material selected from the group consisting of copper, aluminium and stainless steel.

12. An ultraviolet light source according to any of claims 1 to 11, wherein the ultraviolet bulb has an elongate form.

13. An ultraviolet light source according to any of claims 1 to 12 comprising plural ultraviolet bulbs.

14. An ultraviolet light source according to claim 13, comprising from 2 to 25, preferably from 3 to 18 bulbs.

15. An ultraviolet light source to either of claims 13 or 14, wherein said plural ultraviolet bulbs form an arrangement selected from the group consisting of a random arrangement, a side-by-side arrangement, a sequential arrangement, an array arrangement and a cluster arrangement.

16. An ultraviolet light source according to any of claims 1 to 15, wherein the transparent waveguide has a cylindrical or rectangular form.

17. An ultraviolet light source according to any of claims 1 to 16, wherein the microwave energy source comprises a magnetron.

18. An ultraviolet light source according to any of claims 1 to 17, additionally comprising a system for cleaning the enclosure.

19. An ultraviolet light source according to any of claims 1 to 18, additionally comprising a pathguide to guide the microwave energy from the microwave energy source to the ultraviolet bulb.

20. An ultraviolet light source according to claim 19, wherein the pathguide defines an essentially linear path.

21. An ultraviolet light source according to claim 19, wherein the pathguide defines a non-linear path.

22. An ultraviolet light source according to any of claims 19 to 21 wherein the pathguide comprises a coaxial cable.

23. An ultraviolet light source according to any of claims 1 to 22 additionally comprising a housing for said enclosure.

24. An ultraviolet light source according to claim 23, wherein the housing has an inlet and an outlet and the housing is shaped to guide fluid flow from the inlet, past the enclosure to the outlet.

25. An ultraviolet light source according to claim 24, wherein said fluid comprises water or air.

26. An ultraviolet light source according to either of claims 24 or 25, additionally comprising a pump for pumping fluid from the inlet, past the enclosure to the outlet.

27. An ultraviolet light source substantially as described in the accompanying description and drawings

28. A lamp comprising

an ultraviolet bulb, said bulb being excitable by microwave energy; and

an enclosure for enclosing the ultraviolet bulb, the enclosure comprising an optically transparent waveguide,

wherein the dominant wavelength of the lamp is either

(a) from 140 to 240nm and the lamp is suitable for use in promoting molecular dissociation reactions; or

(b) from 300 to 400nm and the lamp is suitable for use in promoting photochemical reactions.

29. A lamp according to claim 28, wherein the dominant wavelength of the lamp is from 160 to 200nm.

30. A lamp according to claim 29, wherein the dominant wavelength of the lamp is from 330 to 370nm.

31. A lamp according to any of claims 28 to 30, wherein the ultraviolet bulb has no electrode.

32. A lamp substantially as described in the accompanying description and drawings

33. A method of promoting the dissociation of a molecular entity comprising

applying microwave energy to an ultraviolet lamp to produce ultraviolet radiation of dominant wavelength of from 140 to 240nm; and

exposing the molecular entity to said ultraviolet radiation, wherein

an enclosure encloses the ultraviolet lamp, the enclosure comprising an optically transparent waveguide.

34. A method according to claim 33, wherein the molecular entity is borne in a fluid such as air or a liquid and the substance-bearing fluid flows past the enclosure.

35. A method according to either of claims 33 or 34, wherein the molecular entity is an organic material.

36. A method according to claim 35, wherein the organic material is oxidisable.

37. A method according to claim 36, for the dissociation of Total Oxidisable Carbon (TOC) in water.

38. A method according to claim 33, wherein the molecular entity is borne on a surface and the ultraviolet radiation is applied to said surface.

39. A method according to claim 38, wherein the molecular entity is a contaminant on the surface.

40. A method according to either of claims 38 or 39, wherein the surface is of a product selected from the group consisting of food products, packaging products and the surfaces of any equipment employed in the manufacture thereof.

41. A method of promoting the dissociation of a molecular entity substantially as described in the accompanying description and drawings.

42. A method of promoting a photochemical reaction in a substance comprising

applying microwave energy to an ultraviolet lamp to produce ultraviolet radiation of dominant wavelength of from 300 to 400nm; and

exposing the entity to said ultraviolet radiation, wherein

an enclosure encloses the ultraviolet lamp, the enclosure comprising an optically transparent waveguide.

43. A method according to claim 42, wherein the substance is borne in a fluid such as air or a liquid and the substance-bearing fluid flows past the enclosure.

44. A method according to claim 42, wherein the substance is borne on a surface and the ultraviolet radiation is applied to the surface.

45. A method of promoting a photochemical reaction in a substance substantially as described in the accompanying description and drawings.

46. An ultraviolet light source comprising

a plurality of ultraviolet bulbs;

a microwave energy source for exciting said plurality of ultraviolet bulbs; and

an enclosure for enclosing the plurality of ultraviolet bulbs, the enclosure comprising an optically transparent waveguide.

47. A lamp comprising

a plurality of ultraviolet bulbs, said plurality of bulbs being excitable by microwave energy; and

an enclosure for enclosing the plurality of ultraviolet bulbs, the enclosure comprising an optically transparent waveguide.